

1 1. A purified and isolated DNA molecule consisting essentially of the nucleotide sequence  
2 set forth in SEQ ID NO:1, or its complementary strand.

1 2. The purified and isolated DNA molecule of Claim 1, wherein said DNA molecule  
2 encodes for a purified and isolated protein molecule consisting essentially of the amino acid  
3 sequence set forth in SEQ ID NO:2.

Sub  
AN  
7  
3. A live, attenuated strain of *V. anguillarum* which comprises:  
2 a mutated *mugA* gene, the strain characterized in that it is incapable of expressing a  
3 functional *mugA* protein.

4. The live, attenuated strain according to claim 3 wherein the strain is incapable of growing  
2 in salmon intestinal mucus.

5. The live, attenuated strain according to claim 3 wherein the mutation is non-revertible.

6. The live, attenuated strain according to claim 4 wherein the mutation is an insertion.

7. The live, attenuated strain according to claim 4 wherein the mutation is a deletion.

8. A vaccine strain against *V. anguillarum* infection in an animal comprising:  
2 a live, attenuated strain of *V. anguillarum*, the strain comprised of a mutated *mugA* gene,  
3 the strain characterized in that it is incapable of expressing a functional *mugA* protein.

9. The vaccine strain according to claim 8 wherein the strain further comprises a  
2 pharmaceutically acceptable carrier.

1 10. The vaccine strain according to claim 8 wherein the animal is a fish.

1 11. The vaccine strain according to claim 8 wherein the animal is a bivalve.

1 12. The vaccine strain according to claim 8 wherein the animal is a crustacean.

1 13. The vaccine strain according to claim 8 wherein the mutation is non-revertible.

1 14. The vaccine strain according to claim 13 wherein the mutation is an insertion.

1 15. The vaccine strain according to claim 13 wherein the mutation is a deletion.

1 16. A method for immunizing an animal against *V. anguillarum* infection in an animal which  
2 comprises:

3 administering to the animal a vaccine comprised of a live, attenuated strain of  
4 *V. anguillarum*, the strain comprised of a mutated *mugA* gene, the strain characterized in that it is  
5 incapable of expressing a functional *mugA* protein as a result of the mutation in the *mugA* gene.

1 17. The method according to claim 16 wherein administering comprises immersion.

1 18. The method according to claim 16 wherein administering comprises intraperitoneal  
2 injection.

1 19. The method according to claim 16 wherein administering comprises oral intubation.

2 20. The method according to claim 16 wherein administering comprises anal intubation.

21. The method according to claim 16 wherein administering comprising immersing the animal in a medium containing the attenuated strain.

22. The method according to claim 16 wherein the animal is a fish.

23. The method according to claim 16 wherein the animal is a bivalve.

24. The method according to claim 16 wherein the animal is a crustacean.

25. The method according to claim 16 wherein the mutation in the *mugA* gene is non-revertible.

26. The method according to claim 25 wherein the mutation in the *mugA* gene is an insertion.

27. The method according to claim 25 wherein the mutation in the *mugA* gene is a deletion.

28. A method of inducing an immune response in an animal against one or more pathogens which comprises transforming a live, attenuated strain of *V. anguillarum*, the strain characterized in that it is incapable of expressing a functional *mugA* protein, with a plasmid comprising DNA of interest encoding at least one protein antigen for each of the pathogens and administering the transformed strain to an animal.

29. A method for the detection of the presence of *V. anguillarum* in animal tissue or fluids comprising:

contacting the sample with a detectably labeled DNA probe wherein the probe comprises a detectable single-stranded DNA having a nucleotide sequence which specifically and

5 selectively hybridizes with DNA of *V. anguillarum* , the DNA probe comprising a nucleotide  
6 sequence selected from the group consisting of SEQ ID NO. 1, whereby the presence of the  
7 DNA is indicative of a *V. anguillarum* infection.

WFO  
A

10945706 072504